

We claim:

- 1 ✓ 1. A method of adaptively routing connections through a connection-oriented data
2 network, said connection-oriented data network including a plurality of switches and a
3 plurality of links connecting said switches, said method comprising:
4 at a given one of said plurality of switches,
5 receiving an indication of a utilization of a trunk carried on one of said
6 plurality of links, where said one of said plurality of links connects to said
7 given one of said plurality of switches; and
8 if said utilization of said trunk exceeds a first threshold, initializing a first
9 degree of adaptation.
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1 8. The method of claim 7 further comprising, if said utilization of said trunk falls below
2 said first threshold for a preset downgrade duration, indicating to other switches of said
3 plurality of switches that adaptation is no longer active on said trunk.

1 ✓ 9. The method of claim 1 further comprising, if said utilization of said trunk exceeds a
2 second threshold, initializing a second degree of adaptation.

1 ✓ 10. The method of claim 9 further comprising, responsive to said initializing said second
2 degree of adaptation, consulting a policy database to determine a course of action.

1 ✓ 11. The method of claim 9 wherein said second degree of adaptation comprises identifying a
2 misbehaved connection, among a plurality of connections using said trunk.

1 ✓ 12. The method of claim 11 further comprising sending a congestion notification to a source
2 of said misbehaved connection.

1 ✓ 13. The method of claim 11 further comprising altering said policy database to reduce a
2 priority associated with said misbehaved connection.

1 ✓ 14. The method of claim 9 further comprising, if said utilization of said trunk exceeds a
2 third threshold, initializing a third degree of adaptation.

1 ✓ 15. The method of claim 14 further comprising, responsive to said initializing said third
2 degree of adaptation, consulting a policy database to determine a course of action.

1 16. The method of claim 14 wherein said third degree of adaptation comprises:

2 selecting a candidate connection, among said plurality of connections using said
3 trunk, for rerouting, where said candidate connection is associated with a path
4 between a source and a destination, where said trunk is a segment of said path and
5 said trunk connects said given one of said plurality of switches to a second one of
6 said plurality of switches; and
7 acting such that said candidate connection is switched to an alternate path between
8 said source and said destination, where said alternate path excludes said trunk.

1 ✓ 17. The method of claim 16 wherein said selecting said candidate connection is based on
2 specific characteristics of said plurality of connections using said trunk.

1 ✓ 18. The method of claim 16 wherein said acting comprises sending a rerouting request to a
2 third one of said plurality of switches, where said third switch precedes of said given one of
3 said plurality of switches in said path.

1 ✓ 19. The method of claim 18 wherein said third switch is said source of said candidate
2 connection.

1 ✓ 20. The method of claim 18 wherein said rerouting request indicates that said candidate
2 connection should be established on said alternate path before said candidate connection is
3 removed from said path.

1 ✓ 21. The method of claim 16 wherein said acting comprises determining an alternate path
2 segment, where said alternate path segment connects said given one of said plurality of
3 switches to said second one of said plurality of switches and excludes said trunk.

1 ✓ 22. The method of claim 21 further comprising:

2 establishing said candidate connection on said alternate path; and

3 responsive to said establishing, removing said candidate connection from said trunk.

1 23. The method of claim 16 further comprising, if said utilization of said trunk continues to
2 exceed said third threshold for a preset duration, repeating said selecting and acting for an
3 additional candidate connection.

1 ✓ 24. The method of claim 14 further comprising, if said utilization of said trunk exceeds a
2 fourth threshold, initializing a fourth degree of adaptation.

1 ✓ 25. The method of claim 24 further comprising, responsive to said initializing said fourth
2 degree of adaptation, consulting a policy database to determine a course of action.

1 ✓ 26. The method of claim 24 wherein said fourth degree of adaptation comprises:

2 selecting a further candidate connection, among said plurality of connections using
3 said trunk, for further rerouting, where said further candidate connection is
4 associated with a further path between a further source and a further destination,,
5 where said trunk is a further segment of said further path; and

6 acting such that said further candidate connection is switched to a further alternate
7 path between said further source and said further destination, where said further
8 alternate path excludes said trunk.

1 27. The method of claim 26 wherein said selecting said candidate connection is based on
2 specific characteristics of said plurality of connections using said trunk.

1 28. The method of claim 26 wherein said acting comprises sending a further rerouting
2 request to a third one of said plurality of switches, where said third switch precedes of said
3 given one of said plurality of switches in said further path.

1 29. The method of claim 28 wherein said further rerouting request indicates that said further
2 candidate connection should be removed from said further path before said further
3 candidate connection is established on said further alternate path.

1 30. The method of claim 9 further comprising, if said utilization of said trunk falls below
2 said second threshold for a preset downgrade duration, reducing said degree of adaptation
3 from said second degree of adaptation to said first degree of adaptation.

1 31. The method of claim 14 further comprising, if said utilization of said trunk falls below
2 said third threshold for a preset downgrade duration, reducing said degree of adaptation
3 from said third degree of adaptation to said second degree of adaptation.

1 32. A path administrator in a switch in a connection-oriented data network, said path
2 administrator operable to:

3 receive an indication of a utilization of a trunk carried on a link connected to said
4 switch; and

busy

5 initialize a first degree of adaptation if said utilization of said trunk exceeds a first
6 threshold.

1 ✓ 33. A path administrator in a switch in a connection-oriented data network, said path
2 administrator comprising:

3 a receiver for receiving an indication of a utilization of a trunk carried on a link
4 connected to said switch; and

5 means for initializing a first degree of adaptation if said utilization of said trunk
6 exceeds a first threshold.

0 ✓ 34. The path administrator of claim 33 further comprising means for consulting a policy
2 database to determine a course of action.

1 ✓ 35. The path administrator of claim 34 further comprising means for preventing new
2 connections having specific characteristics from being established on said trunk.

1 ✓ 36. The path administrator of claim 33 further comprising means for indicating to other
2 switches of said plurality of switches that adaptation is active on said trunk.

1 ¶ 37. The path administrator of claim 36 wherein said means for indicating further comprises
2 means for indicating to other switches of said plurality of switches that adaptation is no
3 longer active on said trunk.

1 \ 38. The path administrator of claim 33 further comprising means for identifying a
2 misbehaved connection, among a plurality of connections using said trunk.

1 39. The path administrator of claim 33 further comprising:

2 means for selecting a candidate connection, among a plurality of connections using
3 said trunk, for rerouting, where said candidate connection is associated with a path
4 between a source and a destination; and

5 means for acting such that said candidate connection is switched to an alternate path
6 between said source and said destination, where said alternate path excludes said
7 trunk.

1 ✓ 40. A computer readable medium containing computer-executable instructions which, when
2 performed by a processor in a switch in a connection-oriented data network, cause the
3 processor to:

4 receive an indication of a utilization of a trunk carried on a link connected to said
5 switch; and

6 initialize a first degree of adaptation if said utilization of said trunk exceeds a first
7 threshold.

1 ✓ 41. The computer readable medium of claim 40 wherein said computer-executable
2 instructions further cause the processor to consult a policy database to determine a course
3 of action responsive to said initializing said first degree of adaptation.

1 ✓ 42. The computer readable medium of claim 40 wherein said computer-executable
2 instructions further cause the processor to prevent new connections having specific
3 characteristics from being established on said trunk.

1 ✓ 43. The computer readable medium of claim 40 wherein said computer-executable
2 instructions further cause the processor to indicate to other switches of said plurality of
3 switches that adaptation is active on said trunk.

1 8 44. The computer readable medium of claim 43 wherein said computer-executable
2 instructions further cause the processor to indicate to other switches of said plurality of
3 switches that adaptation is no longer active on said trunk if said utilization of said trunk
4 falls below said first threshold for a preset downgrade duration.

1 \ 45. The computer readable medium of claim 40 wherein said computer-executable
2 instructions further cause the processor to identify a misbehaved connection, among a
3 plurality of connections using said trunk.

1 \q 46. The computer readable medium of claim 40 wherein said computer-executable

2 instructions further cause the processor to:

3 select a candidate connection, among said plurality of connections using said trunk,
4 for rerouting, where said candidate connection is associated with a path between a
5 source and a destination, where said trunk is a segment of said path and said trunk
6 connects said given one of said plurality of switches to a second one of said plurality
7 of switches; and

8 act such that said candidate connection is switched to an alternate path between said
9 source and said destination, where said alternate path excludes said trunk.